Rain and Radio.

Radio does not cause droughts, nor floods either, as some have asserted. Nature's first act in the production of rain is to get an abundance of water vapor into the air. This is accomplished by the evaporation of water, mainly from seas, lakes, rivers, damp soil, and growing vegetation, and to a much less extent from many other minor sources. This evaporation is accomplished only at the expense of a surprising amount of heat. Indeed, the heat necessary to evaporate one pound of water, at ordinary temperatures, would raise six pounds of ice water to the boiling point. In the case of natural evaporation, by which vapor is gotten into the atmosphere, all this heat comes from either that already in the evaporating water, and plants and soil associated with it, or from heat supplied to them, especially by sunshine.

Nature's next step in producing rain is based on the fact that the maximum amount of water vapor that, in the presence of condensation nuclei, can exist in a given space, increases rapidly with increase of temperature, in fact much more rapidly than the temperature. This step, then is to cool the water vapor in the atmosphere, and of necessity the other 97%, say, of the air with which it is intimately mixed, to below that temperature at which the space concerned is saturated; whereupon the supersaturation portion of the vapor condenses out in the form, usually, of cloud droplets about the always-present nuclei - microscopic salt particles and other hygroscopic substances. Under proper conditions these droplets in large measure grow to a size great enough to cause them to fall as rain. Nearly all this cooling is owing to the work of expansion of ascending humid air against the pressure around it, and this ascent, in turn, is produced by local surface heating, resulting in a chimney-like ascending column capped by a cumulus cloud; by the flowing of the moist air up the side of a mountain or up a sloping barrier of relatively cold air; or, finally, by being underrun and pushed up by an advancing mass of cooler air.

Clearly, then, if radio affects precipitation it must do so by supplying heat so as to increase evaporation; by locally heating the air enough to cause convection; or by cooling the air sufficiently to cause condensation, directly or by the creation of a barrier of cold air up which the winds would have to climb as they do up a mountain range. Now, no one has ever noticed, or claimed, that a radio station, sending or receiving, acts in any sense like a great refrigerator, nor indeed does it so act. On the contrary the energy used in generating the wireless waves must quickly be transformed into heat - the destiny of all energy. But of this there is not enough appreciably to increase the water in the air by evaporation, or temporarily to render the space (air, we commonly say) dryer by making the air and the vapor in it warmer. In fact, the total energy now (close of 1934) expended by all the radio stations in the United States combined, is, per day, 21,000 kilowatt hours. From this the numerically minded easily can compute that if all this energy went to evaporating water the quantity so transformed in an entire week would amount to only one good rain for a garden patch, or, to be exact,

a one-inch rain (rain enough to make a horizontal layer of water one inch deep) over two acres. Evidently, therefore, radio can have no measurable effect whatever on any of the processes by which rain is produced, and none, of course, on the final result, the rain itself.

Some, however, insist, that radio removes or destroys atmospheric electricity, and thereby prevents rain. In the first place, it does nothing of the kind, as observations abundantly show; and in the second place, the amount of rainfall, as records again show, is not affected by the electrical state of the atmosphere, though this state itself is altered by rain.

The radio affects no weather element whatever. It plays no part in the cause of droughts, nor is it in the remotest degree responsible for heavy rains.